NOTES ON THE X-RAY TREATMENT OF WHOOPING-COUGH *

By JOHN J. KINGSTON, M. D., and HAROLD K. FABER, M. D.
(From the Division of Pediatrics, Stanford University Medical School, San Francisco.)

In a recent communication Bowditch and Leonard reported the favorable results obtained following the use of the X-ray in pertussis. They gave three to four treatments at intervals of two to three days, regulating the dosage according to the age of the patient, and in a small percentage of twenty-six cases a prompt cure was obtained—70 per cent were improved, while from 10 to 15 per cent were not relieved.

In the past few months all the cases of pertussis coming to the Stanford Children's Clinic were referred to the X-ray department. They were given from one to three exposures, at weekly intervals, of one-fourth the erythema dose—20 milliampere minutes, target skin, distance 12 inches, 9¾-inch spark gap ¼ mm. copper filter, over a large area of the chest, both front and back. Only undoubted cases of pertussis were included in this series, the diagnosis being made on both the history and character of the cough while under observation. In many of the cases white and differential blood counts were also obtained. Twenty-four patients were given this treatment and observed over a long enough period to allow us to draw some conclusions regarding its efficacy. The children ranged in age from seven months to thirteen years and were in all stages of the disease, the duration of the symptoms varying from three days to one month when treatment was instituted.

Four of the cases showed remarkable improvement after the initial treatment, while two of the children were not relieved even after three exposures. Ten of the remainder were markedly better after two treatments, the vomiting and, in most instances, the typical paroxysms stopping. The other eight showed a more gradual improvement, but were not considered cured after the last treatment. Perhaps the most constant effect of X-ray was the prompt cessation of vomiting, which occurred even in those cases where the whoop did not abate. Naturally the interpretation of the results is open to the criticism that the technic of the treatment required three weeks for completion, and the normal convalescence may have been overlooked in ascribing the improvement to the X-ray exposures. It is our belief, however, that the severity and length of the disease was not as marked in these cases as in others we have treated with vaccine and the usual sedatives and anti-spasmodics. Many of the patients have escaped the usual residual cough, and in none has it been troublesome.

We will not attempt, from this limited study, to draw any conclusions as to how the beneficial effects are obtained or why the results are not uniform. With our present knowledge we are unable to foretell which patient will be benefited. Apparently neither the age, blood count, duration, or clinical severity of the disease are criteria as to its possible course under treatment.

A rough analysis of our figures shows that, in the whole group before treatment, there were 445-489 paroxysms of whooping daily; after one treatment the number was reduced to 218-245, or 49-50 per cent of the previous figure; after two treatments, to 65-74, or 15 per cent of the original; and after three treatments, to 9-10, or about 2 per cent of the original number. Whooping ceased in five cases after one treatment; in five cases, after two treatments; in seven cases, after three treatments; and in one case after four treatments. Three patients were still whooping after two treatments, and three, after three treatments, these being cases which failed to report again. The very sharp immediate reduction in frequency to half after one treatment would seem to indicate a definite response to the X-ray.

While the exact value, and limitations of the method demand further study, we feel that the definite improvement secured in many patients and the prompt and almost complete relief obtained in a few, constitute a positive gain in the treatment of a disease which is very rarely susceptible by other methods of more than temporary symptomatic relief. The fact that complete failure is met with in a certain proportion of cases should be explained in advance to the parents, but does not alter our belief that the X-ray treatment is at present the most promising therapeutic measure which we possess for pertussis. No ill effects from radiation have been encountered.

We gratefully acknowledge the co-operation of Drs. W. E. Chamberlain and Robert Newell of the X-ray department, without which the present study could not have been made.

Case No. 1—Age, 10 months; duration of disease, 1 month; W. B. C., 19,350; per cent lymphocytes, 20; number of paroxysms in 24 hours, 10-13; number of X-ray treatments, 2. After first treatment, 4-5 paroxysms daily; vomited with each spell; after second treatment no whooping or vomiting; cough 2-3 x daily; cured 3 weeks after first treatment.

Case No. 2—Age, 2 years; duration of disease, 2 weeks; number of paroxysms in 24 hours, 20-24; number of X-ray treatments, 3. Had 4 vaccine injections before X-ray treatment; seemed worse after first treatment; marked improvement after second; 2 paroxysms daily; no vomiting; did not report after third.

Case No. 3—Age, 5½ years; duration of disease, 3 weeks; W. B. C., 24,600; per cent lymphocytes, 57; number of paroxysms in 24 hours, 10-12; number of X-ray treatments, 1. Much better after first treatment; no vomiting or whoop; slight coughing spells 4-5 x daily; total duration less than 3 weeks.

Case No. 4—Age, 11 years; duration of disease, 5 days; W. B. C., 11,650; per cent lymphocytes, 33; number of paroxysms in 24 hours, 6; number of X-ray treatments, 3. Improved immediately after first treatment; no cough for 5 days after first treatment; then slight cough, but no paroxysms or vomiting; 3 weeks later no paroxysms or vomiting; coughing only once a day.

Case No. 5—Age, 1 year; duration of disease, 1 month; number of paroxysms in 24 hours, 4; number of X-ray treatments, 1. Immediate improvement after treatment; no vomiting or paroxysms; reported 3 weeks later, only one slight coughing spell in 24 hours.

Case No. 6—Age, 7 months; duration of disease,

*Presented to the Section on Pediatrics at the Fifty-second Annual Session of the California Medical Association, San Francisco, June, 1923.

2 weeks; number of paroxysms in 24 hours; 40-48; number of X-ray treatments, 2. After first treatment no paroxysms; vomiting 0-2; slight cough 4 x daily; after second treatment marked improvement; no cough or vomiting.

Case No. 7—Age, 2½ years; duration of disease, 3 weeks; W. B. C., 40,000; per cent lymphocytes, 72; number of paroxysms in 24 hours, 48; number of X-ray treatments, 3. No improvement till second treatment, then 9 paroxysms daily; vomiting 0-2; nose-bleed after third; seems worse after this treatment; 5 weeks after first treatment still coughing 8 x day.

Case No. 8—Age, 4 years; duration of disease, 2 weeks; number of paroxysms in 24 hours, 16; number of X-ray treatments, 2. No whoop after first treatment, but coughs 10-12 x daily; frequent vomiting; marked improvement after second treatment; no vomiting, practically no cough.

Case No. 9—Age, 2 years; duration of disease, 1 month; number of paroxysms in 24 hours, 24; number of X-ray treatments, 2. Better after first treatment; no vomiting; 8 paroxysms daily, much better after second treatment; practically no cough.

Case No. 10—Age, 4 years; duration of disease, 3 weeks; W. B. C., 13,400; per cent lymphocytes, 65; number of paroxysms in 24 hours, 24-30; number of X-ray treatments, 2. No vomiting after first treatment; 7-8 paroxysms daily; after second only 3 paroxysms daily.

Case No. 11—Age, 3½ years; duration of disease, 10 days; W. B. C., 10,200; per cent lymphocytes, 43; number of paroxysms in 24 hours, 24; number of X-ray treatments, 3. Slight improvement after first treatment; after second treatment no vomiting; paroxysms 3 x daily.

Case No. 12—Age, 5½ years; duration of disease, 1 month; W. B. C., 17,200; per cent lymphocytes, 49; number of paroxysms in 24 hours, 48; number of X-ray treatments, 2. Marked improvement after first treatment; vomiting 1-2; paroxysms 3-4; after second treatment no vomiting; paroxysms 3; cured after third.

Case No. 13—Age, 2 years; duration of disease, 1 week; W. B. C., 10,310; per cent lymphocytes, 71; number of paroxysms in 24 hours, 15-16; number of X-ray treatments, 3. No improvement after first treatment; after second, 8-10 paroxysms daily; condition same after third.

Case No. 14—Age, 4 years; duration of disease, 3 weeks; W. B. C., 9300; per cent lymphocytes, 67; number of paroxysms in 24 hours, 6-8; number of X-ray treatments, 3. No improvement after first treatment; after second, 1-2 paroxysms daily; cured after third.

Case No. 15—Age, 4 years; duration of disease, 3 days; W. B. C., 8800; per cent lymphocytes, 53; number of paroxysms in 24 hours, 5; number of X-ray treatments, 3. After first treatment, 5 paroxysms; no vomiting; after second treatment, 2 paroxysms; after third, no paroxysms; slight residual cough.

Case No. 16—Age, 13 years; duration of disease, 4 days; W. B. C., 15,410; per cent lymphocytes, 38; number of paroxysms in 24 hours, 21-26; number of X-ray treatments, 3. No improvement after first; after second, 6-8 paroxysms daily; no vomiting; cured after third.

Case No. 17—Age, 6 years; duration of disease, 6 weeks; number of paroxysms in 24 hours, 6-8; number of X-ray treatments, 3. Marked improvement after first; vomiting stopped; 4-5 paroxysms; after second, 3 paroxysms; cured after third.

Case No. 18—Age, 2 years; duration of disease, 2 weeks; W. B. C., 20,000; per cent lymphocytes, 57; number of paroxysms in 24 hours, 12-20; number of X-ray treatments, 3. Improved after first; no vomiting; paroxysms 8 daily, not as severe; after second, 2 paroxysms daily; none after third treatment.

Case No. 19—Age, 5 months; duration of disease, 2 weeks; number of paroxysms in 24 hours, 8-10; number of X-ray treatments, 3. No improvement after first treatment; vomiting 2 x after second; paroxysms 8-10; vomiting and paroxysms stopped after third.

Case No. 20—Age, 3½ years; duration of disease, 3 weeks; number of paroxysms in 24 hours, 20+; number of X-ray treatments, 3. Marked improvement after first; no vomiting; 7 paroxysms daily; no paroxysms of vomiting after second treatment.

Case No. 21—Age, 5 years; duration of disease, 5 weeks; number of paroxysms in 24 hours, 5; number of X-ray treatments, 3. 1-2 paroxysms after first treatment; started vomiting supper after first treatment; no vomiting after second; 1 paroxysm daily; cured after third.

Case No. 22—Age, 1½ years; duration of disease, 3 weeks; number of paroxysms in 24 hours 40; number of X-ray treatments, 3. Improved after first; 8-10 paroxysms; occasional vomiting; did not return after third.

Case No. 23—Age, 9 years; duration of disease, 3 weeks; W. B. C., 7950; per cent lymphocytes, 40; number of paroxysms in 24 hours, 24; number of X-ray treatments, 2. Improved after first; no vomiting; 7-9 paroxysms daily; cured after second treatment.

Case No. 24—Age, 5 years; duration of disease, 1 week; W. B. C., 10,000; per cent lymphocytes, 55; number of paroxysms in 24 hours, 8-10; number of X-ray treatments, 4. No improvement after first; X-ray; started vomiting after second; paroxysms 10; after third no vomiting; 1-2 paroxysms; only slight residual cough after fourth.

DISCUSSION

Dr. Clifford D. Sweet (440 Seventeenth Street, Oakland)—Our thanks are due Drs. Kingston and Faber for presenting their results to us. As they have pointed out, their series is too small to give these results their final value. Nevertheless, this method of treating whooping-cough is sufficiently successful to make further study of it desirable by all who have facilities available. The results of these further studies we will all await anxiously, hoping that a valuable method of relief for our patients has been found.

Reforming Fashionable—Have you ever stopped to think that everybody is a member of some society or other whose object is to reform somebody or other? According to a recent report there are over 1500 national "anti societies" in the United States, all working excitedly to prevent somebody from doing something they are supposed to want to do.

Reforming is very fashionable. Everybody is doing it. The rich are busy reforming the poor and the poor are passionately pleading with the rich to mend their ways. A man may violate the Volstead Act daily and gaily, and yet hold important office in a society the object of which is to enforce some other law. There are hundreds of organizations, employing thousands of people, campaigning loudly every day in the year for the enactment of some law or other. No sooner do we get the law enacted than we are importuned to organize to enforce it, and the day after the next we wake up to find that our neighbors have organized to repeal it!—Pictorial Review, June, 1923.